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ABSTRACT

This study identified skills that should be taught in the agricultural mechanics area of production vocational agriculture courses in Texas high schools. The data were obtained from questionnaires given to 50 young farmers who had been recognized by the State Association of Young Farmers of Texas for outstanding farming programs during one of the five years, 1964 through 1969. Forty-six people or 92 per cent returned completed questionnaires. The objectives of the questionnaire were to determine the level of importance of selected mechanical skills needed by successful farmers, to determine the association of selected variables (type of farming, size of farming business, age, and education) with the level of importance assigned to selected mechanical skills needed by farmers, and to formulate recommendations for establishing priorities for the selection of skills that should be taught in the mechanical area of courses in vocational agriculture. (KP)

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AGRICULTURAL MECHANICAL SKILLS NEEDED BY FARMERS IN TEXAS

by

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FOREWORD

The primary purpose of this publication is to assist teachers, teacher educators, curriculum directors and state department of education personnel in the evaluation of programs in agricultural mechanics and in the construction of courses of study. Realistic programs are essential because agriculture is highly mechanized. Farmers are confronted daily with mechanical problems with which they must be able to cope if they are to be successful.

The major portion of the research for this report was conducted by Clifton Don Knotts, research assistant in agricultural education. He is currently employed as head teacher educator in agricultural education at Prairie View A. and M. College, Prairie View, Texas. A complete report of this research is available from University Microfilms, Ann Arbor, Michigan, or from the Texas A&M University Library.

Earl S. Webb, Professor
September, 1970

AGRICULTURAL MECHANICAL SKILLS NEEDED BY FARMERS IN TEXAS

Purpose

The purpose of this research was to identify the skills that should be taught in the agricultural mechanics area of production vocational agriculture courses in Texas high schools. The following specific objectives were formulated to accomplish this purpose:

1. To determine the level of importance of selected mechanical skills needed by successful farmers.

2. To determine the association of selected variables (type of farming, size of farming business, age, and education) with the level of importance assigned to selected mechanical skills needed by farmers.

3. To formulate recommendations for establishing priorities for the selection of skills that should be taught in the mechanical area of courses in vocational agriculture.

Procedure

Information was requested from 50 young farmers who had been recognized by the State Association of Young Farmers of Texas for outstanding farming programs during one of the five years, 1964 through 1969. Forty-six or 92 percent returned completed questionnaires.

Data were obtained by use of a questionnaire developed through a review of the literature, interviews with young and adult farmers, agricultural mechanics teachers, and teachers of vocational agriculture. The questionnaire consisted of 65 items describing skills, and questions pertaining to age, education, size of business, and type of farming or ranching enterprise. Skills were identified within the five mechanical areas of farm power and machinery, farm shop, farm electricity, buildings and conveniences, and soil and water management. Young farmers were asked to indicate on a scale of from 1 through 6 the level of importance they believed each skill to be. The mean for each skill was determined. Skills which received a mean rating of 4.50 or above were placed in Priority Level I. Those that received a rating of 2.50 to 4.49 were placed in Priority Level II. Skills receiving a rating of 2.49 or below were placed in Priority Level III. Only two of the 65 skills listed on the questionnaire were rated 2.49 or below.

To determine the association of the variables (size of business, age, education) with the levels of importance assigned to individual skills, product-moment correlation was used. The discrete variable, type of farming, was treated by point biserial correlation.

Summary

Following is a presentation of skills within each mechanical area ranked according to the levels of importance assigned by respondents.

Farm Power and Machinery

Be able to operate the farm tractor and equipment safely

Be able to service machinery and equipment according to operator's service manual

Be able to determine cause of trouble of machinery and equipment

Be able to select the size and type of machinery and equipment appropriate for farming operations

Be able to adjust farm implements under field conditions

Be able to keep records of maintenance and repair on machinery and equipment

Be able to prepare machinery and equipment for storage

Be able to assemble farm implements

Be able to perform electrical wiring jobs on farm machinery and implements

Be able to overhaul farm engines

Buildings and Conveniences

Be able to construct farm fences

Be able to repair farm buildings

Be able to maintain farm water systems

Be able to maintain plumbing fixtures (repair leaky valves and faucets, and the like)

Be able to construct farm buildings

Be able to install farm water systems

Be able to construct portable buildings (feeders and other easily movable buildings)

Be able to maintain farm sewage disposal systems

Be able to install plumbing fixtures

Be able to maintain farm gas systems

Be able to install farm sewage disposal systems

Be able to perform concrete masonry jobs

Be able to make working drawings (free hand or sketch building and equipment plans)

Be able to install farm gas systems

Be able to read a blueprint

Farm Electricity

Be able to install general purpose circuits (common 110 volt wall outlets, switches, receptacles, and the like)

Be able to select the proper size and type of motors

Be able to maintain electric motors (clean and oil and the like)

Be able to select the proper size and type of electric wire

Be able to inspect electric wiring systems to determine the cause of trouble

Be able to wire the farmstead

Be able to install electric equipment (automatic feeders, conveyers, livestock poultry brooders, and the like)

Be able to plan wiring system for farmstead

Be able to install circuits for major appliances and equipment (central air, stoves, welders, and the like)

Be able to figure cost of electricity

Be able to repair electric motors

Farm Shop

Be able to use power tools (drills, power saws, and the like)

Be able to use hand tools (hammers, saws, measuring devices, planes, chisels, and the like)

Be able to weld with arc welder

Be able to cut with oxyacetylene torch

Be able to plan a farm shop (select building tools, equipment, and supplies)

Be able to do blacksmithing (heat metal with forge or gas torch and bend and/or to straighten, and the like)

Be able to use spray painting equipment

Be able to do cold metal work (drill, bend, rivet, thread, file, and saw metal, and the like)

Be able to weld with oxyacetylene gas

Be able to use hand painting equipment

Be able to recondition hand tools (chisels, auger bits, twist drills, saws, shovels, and the like)

Be able to use wood preservatives (other than paint)

Be able to select metals

Be able to solder

Be able to do rope work (make splices, knots, hitches, halters, tackles, and the like)

Be able to glaze (cut and/or fit glass. Example: Replace and/or repair window panes)

Soil and Water Management

Be able to maintain drainage system

Be able to maintain terraces and contours

Be able to maintain farm ponds and waterways

Be able to survey land to determine acreage

Be able to interpret land use maps

Be able to construct terraces and contours

Be able to operate farm level (transit)

Be able to level and grade land

Be able to maintain irrigation system for particular farming operations

Be able to construct farm ponds and waterways

Be able to estimate cost of draining and/or irrigation system

Be able to install irrigation system for particular farming operation

Be able to make soil profile map

Following is a summary of characteristics of respondents and the association of variables (age, education, type of farming, and size of business) with each of the mechanical skills that were found to be significant at the .05 level of probability.

1. The average age of the respondents was 33.6 years with a range from 24 to 40 years.

2. The mean number of years of education completed by respondents was 12.5.

3. The sample consisted of 15 crop, 15 dairy, 11 general, and 5 livestock farmers.

4. The mean of annual gross sales of respondents was $63,000. The range was from less than $10,000 to more than $150,000.

5. Age was significantly associated with the level of importance assigned to only two of the 65 skills: to overhaul farm engines and to repair electric motors.

6. Educational level was significantly associated with the level of importance assigned to only two of the 65 skills: to overhaul farm engines and to do blacksmithing.

7. Type of farming was associated with the level of importance assigned to skills in approximately 46 percent of the instances.

8. Size of business was associated with the level of importance assigned to skills in approximately 12 percent of the cases.

Conclusions

Insofar as the responses of this investigation are representative, the following conclusions seem appropriate:

1. Course content for vocational education has a high level of validity when based upon the knowledge and skills required in the occupation for

which training is offered.

2. Valid information for developing course content can be obtained from those considered to be successful in their occupation.

3. Knowledge and skills included in courses of study for vocational education can be ranked according to their importance in the occupation.

4. Specialized areas within an occupational category tend to influence, to a great extent, the nature of the knowledge and skills needed by persons employed within an occupational category.

Recommendations

The following recommendations are based upon the analysis of data:

1. Courses of study in agricultural mechanics at the high school and post high school levels should be evaluated by valid information obtained from an occupational analysis.

2. Persons in teacher education should constantly evaluate programs in agricultural mechanics to assure the adequate preparation of teachers for developing meaningful courses of study and for providing instruction that will enable present and prospective farmers to be successful farm operators.

3. In-service programs in the form of workshops and graduate study should be initiated in the area of agricultural mechanics to enable teachers to become more competent in teaching students the knowledge and skills needed for modern farming.

4. Skills assigned Priority Level I rating by respondents should constitute the basis for the development of courses of study in agricultural mechanics. Based upon this recommendation the following skills should become the foundation for courses in agricultural mechanics for persons engaged in farming or for those planning to enter the occupation. Skills are grouped by mechanical areas for convenience and not as a recommendation as to order in which they should be taught.

Farm Power and Machinery

Be able to operate the farm tractor and equipment safely

Be able to service machinery and equipment according to operator's service manual

Be able to determine cause of trouble of machinery and equipment

Be able to select the size and type of machinery and equipment appropriate for farming operations

Be able to adjust farm implements under field conditions

Be able to keep records of maintenance and repair on machinery and equipment

Buildings and Conveniences

Be able to construct farm fences

Be able to repair farm buildings

Be able to maintain farm water systems

Be able to maintain plumbing fixtures (repair leaky valves and faucets, and the like)

Be able to construct farm buildings

Be able to install farm water systems

Farm Electricity

Be able to install general purpose circuits (common 110 volt wall outlets, switches, receptacles, and the like)

Be able to select the proper size and type of motors

Be able to maintain electric motors (clean and oil and the like)

Farm Shop

Be able to use power tools (drills, power saws, and the like)

Be able to use hand tools (hammers, saws, measuring devices, planes, chisels, and the like)

Be able to weld with arc welder

Be able to cut with oxyacetylene torch

5. The following skills should be taught only after students have learned those assigned a Priority Level I rating. The order in which the mechanical area appears is for convenience and not a recommendation as to the order in which they should be taught.

Farm Power and Machinery

Be able to prepare machinery and equipment for storage

Be able to assemble farm implements

Be able to perform electrical wiring jobs on farm machinery and implements

Be able to overhaul farm engines

Buildings and Conveniences

Be able to construct portable buildings (fences and other easily movable buildings)

Be able to maintain farm sewage disposal systems

Be able to install plumbing fixtures

Be able to maintain farm gas systems

Be able to install sewage disposal systems

Be able to perform concrete masonry jobs

Be able to make working drawings (free hand or sketch building and equipment plans)

Be able to install farm gas systems

Be able to read a blueprint

Farm Electricity

Be able to select the proper size and type of electric wire

Be able to inspect electric wiring systems to determine the cause of trouble

Be able to wire the farmstead

Be able to install electric equipment (automatic feeders, conveyers, livestock poultry brooders, and the like)

Be able to plan wiring system for farmstead

Be able to install circuits for major appliances and equipment (central air, stoves, welders, and the like)

Be able to figure cost of electricity

Farm Shop

Be able to plan a farm shop (select building tools, equipment, and supplies)

Be able to do blacksmithing (heat metal with forge or gas torch to bend and/or to straighten, and the like)

Be able to use spray painting equipment

Be able to do cold metal work (drill, bend, rivet, thread, file and saw metal, and the like)

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Be able to recondition hand tools (chisels, auger bits, twist drills, saws, shovels, and the like)

Be able to use wood preservatives (other than paint)

Be able to select metals

Be able to solder

Be able to do rope work (make splices, knots, hitches, halters, tackles, and the like)

Soil and Water Management

Be able to maintain drainage system

Be able to maintain terraces and contours

Be able to maintain farm ponds and waterways

Be able to survey land to determine acreage

Be able to interpret land use maps

Be able to construct terraces and contours

Be able to operate farm level (transit)

Be able to level and grade land

Be able to maintain irrigation system for particular farming operations

Be able to construct farm ponds and waterways

Be able to estimate cost of draining and/or irrigation system

Be able to install irrigation system for particular farming operation

Be able to make soil profile map

6. The following skills should be considered only after skills in Priority Levels I and II have been taught.

Be able to glaze (cut and/or fit glass. Example: Replace and/or repair window panes)

Be able to repair electric motors

7. In diversified farming areas, consideration should be given to individualized instruction in agricultural mechanics in accordance with the type of farming a student plans to enter or the type of farming in which he is engaged.